Report from the Airplane Performance Harmonization Working Group

Issue: Performance Class B & C Aircraft

1 - What is underlying safety issue to be addressed by the FAR/JAR? [Explain the underlying safety rationale for the requirement. Why should the requirement exist? What prompted this rulemaking activity (e.g., new technology, service history, etc.)?]

The FAR provides aircraft performance criteria based on the type of commercial operation that is being conducted (Part 121 or 135) and aircraft engine type (reciprocating or turbine). The JAR categorizes performance criteria based on the aircraft engine, passenger seating configuration, and maximum allowable takeoff weight. In the JAR, any multi-engine turbojet aircraft is considered a Class A aircraft. In addition, any multi-engine turboprop aircraft with more than 9 passenger seats or a maximum takeoff weight of greater than 5700 kg (12,500 lbs) is also considered a Class A aircraft.

The JAR defines a Class B aircraft as any propeller-driven aircraft with a maximum approved passenger seating configuration of 9 passengers or less, and a maximum takeoff weight of 5700 kg (12,500 lbs) or less.

The JAR defines a Class C aircraft is any aircraft that is powered by reciprocating engines that has more than 9 passenger seats or a maximum takeoff weight of greater than 5700 kg (12,500 lbs).

The Performance Harmonization Working Group was tasked with recommending whether or not to harmonize on aircraft categories to ensure that all FAR and JAR commercial aircraft operations are conducted to an equivalent level of safety.

2 - What are the current FAR and JAR standards relative to this subject? [Reproduce the FAR and JAR rules text as indicated below.]

Current FAR text:

Part 121

§ 121.173 General.

(a) Except as provided in paragraph (c) of this section, each certificate holder operating a reciprocating-engine-powered airplane shall comply with §§ 121.175 through 121.187.
(b) Except as provided in paragraph (c) of this section, each certificate holder operating a turbine-engine-powered airplane shall comply with the applicable provisions of §§ 121.189 through 121.197, except that when it operates -
(1) A turbo-propeller-powered airplane type certificated after August 29, 1959, but previously type certificated with the same number of reciprocating engines, the certificate holder may comply with §§ 121.175 through 121.187; or

(2) Until December 20, 2010, a turbo-propeller-powered airplane described in § 121.157(f), the certificate holder may comply with the applicable performance requirements of appendix K of this part.

(c) Each certificate holder operating a large nontransport category airplane type certificated before January 1, 1965, shall comply with §§ 121.199 through 121.205 and any determination of compliance must be based only on approved performance data.

(d) The performance data in the Airplane Flight Manual applies in determining compliance with §§ 121.175 through 121.197. Where conditions are different from those on which the performance data is based, compliance is determined by interpolation or by computing the effects of changes in the specific variables if the results of the interpolation or computations are substantially as accurate as the results of direct tests.

(e) Except as provided in paragraph (c) of this section, no person may take off a reciprocating-engine-powered airplane at a weight that is more than the allowable weight for the runway being used (determined under the runway takeoff limitations of the transport category operating rules of 14 CFR part 121, subpart I) after taking into account the temperature operating correction factors in the applicable Airplane Flight Manual.

(f) The Administrator may authorize in the operations specifications deviations from the requirements in the subpart if special circumstances make a literal observance of a requirement unnecessary for safety.

(g) The ten mile width specified in §§ 121.179 through 121.183 may be reduced to five miles, for not more than 20 miles, when operating VFR or where navigation facilities furnish reliable and accurate identification of high ground and obstructions located outside of five miles, but within ten miles, on each side of the intended track.

[Amdt. 121-251, 60 FR 65928, Dec. 20, 1995]

§ 121.175 Airplanes: reciprocating engine powered: Weight limitations.

(a) No person may takeoff a reciprocating engine powered airplane from an airport located at an elevation outside of the range for which maximum takeoff weights have been determined for that airplane.

(b) No person may takeoff a reciprocating engine powered airplane for an airport of intended destination that is located at an elevation outside of the range for which maximum landing weights have been determined for that airplane.

(c) No person may specify, or have specified, an alternate airport that is located at an elevation outside of the range for which maximum landing weights have been determined for the reciprocating engine powered airplane concerned.

(d) No person may takeoff a reciprocating engine powered airplane at a weight more than the maximum authorized takeoff weight for the elevation of the airport.

(e) No person may takeoff a reciprocating engine powered airplane if its weight on arrival at the airport of destination will be more than the maximum authorized landing

weight for the elevation of that airport, allowing for normal consumption of fuel and oil enroute.

(f) This section does not apply to large nontransport category airplanes operated under § 121.173(c).

[Amdt. 121-251, 60 FR 65928, Dec. 20, 1995]

§ 121.177 Airplanes: Reciprocating engine powered: Takeoff limitations.

(a) No person operating a reciprocating engine powered airplane may takeoff that airplane unless it is possible -

(1) To stop the airplane safely on the runway, as shown by the accelerate-stop distance data, at any time during takeoff until reaching critical engine failure speed;

(2) If the critical engine fails at any time after the airplane reaches critical engine failure speed V1, to continue the takeoff and reach a height of 50 feet, as indicated by the takeoff path data, before passing over the end of the runway; and

(3) To clear all obstacles either by at least 50 feet vertically (as shown by the takeoff path data) or 200 feet horizontally within the airport boundaries and 300 feet horizontally beyond the boundaries, without banking before reaching a height of 50 feet (as shown by the takeoff path data) and thereafter without banking more than 15 °.

(b) In applying this section, corrections must be made for the effective runway gradient. To allow for wind effect, takeoff data based on still air may be corrected by taking into account not more than 50 percent of any reported headwind component and not less than 150 percent of any reported tailwind component.

(c) This section does not apply to large nontransport category airplanes operated under § 121.173(c).

[Doc. No. 6258, 29 FR 19198, Dec. 31, 1964, as amended by Amdt. 121-159, 45 FR 41593, June 19, 1980; Amdt. 121-251, 60 FR 65928, Dec. 20, 1995]

§ 121.179 Airplanes: reciprocating engine powered: Enroute limitations: all engines operating.

(a) No person operating a reciprocating engine powered airplane may takeoff that airplane at a weight, allowing for normal consumption of fuel and oil, that does not allow a rate of climb (in feet per minute), with all engines operating, of at least 6.90 VS0 (that is, the number of feet per minute is obtained by multiplying the number of knots by 6.90) at an altitude of at least 1,000 feet above the highest ground or obstruction within ten miles of each side of the intended track.

(b) This section does not apply to airplanes certificated under Part 4a of the Civil Air Regulations.

(c) This section does not apply to large nontransport category airplanes operated under § 121.173(c).

[Amdt. 121-251, 60 FR 65928, Dec. 20, 1995]

§ 121.181 Airplanes: Reciprocating engine powered: Enroute limitations: One engine inoperative.

(a) Except as provided in paragraph (b) of this section, no person operating a reciprocating engine powered airplane may takeoff that airplane at a weight, allowing for normal consumption of fuel and oil, that does not allow a rate of climb (in feet per minute), with one engine inoperative, of at least

0.079 - (0.106 / N) * VS02

(where N is the number of engines installed and VS0 is expressed in knots) at an altitude of at least 1,000 feet above the highest ground or obstruction within 10 miles of each side of the intended track. However, for the purposes of this paragraph the rate of climb for airplanes certificated under Part 4a of the Civil Air Regulations is 0.026 VS02.

(b) In place of the requirements of paragraph (a) of this section, a person may, under an approved procedure, operate a reciprocating engine powered airplane, at an all engines operating altitude that allows the airplane to continue, after an engine failure, to an alternate airport where a landing can be made in accordance with § 121.187, allowing for normal consumption of fuel and oil. After the assumed failure, the flight path must clear the ground and any obstruction within five miles on each side of the intended track by at least 2,000 feet.

(c) If an approved procedure under paragraph (b) of this section is used, the certificate holder shall comply with the following:

(1) The rate of climb (as prescribed in the Airplane Flight Manual for the appropriate weight and altitude) used in calculating the airplane's flight path shall be diminished by an amount, in feet per minute, equal to

0.079 - (0.106 / N) * VS02

(where N is the number of engines installed and VS0 is expressed in knots) for airplanes certificated under Part 25 of this chapter and by 0.026 VS02 for airplanes certificated under Part 4a of the Civil Air Regulations.

(2) The all engines operating altitude shall be sufficient so that in the event the critical engine becomes inoperative at any point along the route, the flight will be able to proceed to a predetermined alternate airport by use of this procedure. In determining the takeoff weight, the airplane is assumed to pass over the critical obstruction following engine failure at a point no closer to the critical obstruction than the nearest approved radio navigational fix, unless the Administrator

approves a procedure established on a different basis upon finding that adequate operational safeguards exist.

(3) The airplane must meet the provisions of paragraph (a) of this section at 1,000 feet above the airport used as an alternate in this procedure.

(4) The procedure must include an approved method of accounting for winds and temperatures that would otherwise adversely affect the flight path.

(5) In complying with this procedure fuel jettisoning is allowed if the certificate holder shows that it has an adequate training program, that proper instructions are given to the flight crew, and all other precautions are taken to insure a safe procedure.

(6) The certificate holder shall specify in the dispatch or flight release an alternate airport that meets the requirements of § 121.625.

(d) This section does not apply to large nontransport category airplanes operated under § 121.173(c).

[Amdt. 121-251, 60 FR 65928, Dec. 20, 1995]

§ 121.183 Part 25 airplanes with four or more engines: Reciprocating engine powered: Enroute limitations: Two engines inoperative.

(a) No person may operate an airplane certificated under Part 25 and having four or more engines unless -

(1) There is no place along the intended track that is more than 90 minutes (with all engines operating at cruising power) from an airport that meets the requirements of § 121.187; or

(2) It is operated at a weight allowing the airplane, with the two critical engines inoperative, to climb at 0.013 VS02 feet per minute (that is, the number of feet per minute is obtained by multiplying the number of knots squared by 0.013) at an altitude of 1,000 feet above the highest ground or obstruction within 10 miles on each side of the intended track, or at an altitude of 5,000 feet, whichever is higher.

(b) For the purposes of paragraph (a)(2) of this section, it is assumed that -

(1) The two engines fail at the point that is most critical with respect to the takeoff weight:

(2) Consumption of fuel and oil is normal with all engines operating up to the point where the two engines fail and with two engines operating beyond that point;

(3) Where the engines are assumed to fail at an altitude above the prescribed minimum altitude, compliance with the prescribed rate of climb at the prescribed minimum altitude need not be shown during the descent from the cruising altitude to the prescribed minimum altitude, if those requirements can be met once the prescribed minimum altitude is reached, and assuming descent to be along a net flight path and the rate of descent to be 0.013 VS02 greater than the rate in the approved performance data; and

(4) If fuel jettisoning is provided, the airplane's weight at the point where the two engines fail is considered to be not less than that which would include enough fuel

to proceed to an airport meeting the requirements of § 121.187 and to arrive at an altitude of at least 1,000 feet directly over that airport.

[Amdt. 121-251, 60 FR 65928, Dec. 20, 1995]

§ 121.185 Airplanes: Reciprocating engine powered: Landing limitations: Destination airport.

(a) Except as provided in paragraph (b) of this section no person operating a reciprocating engine powered airplane may takeoff that airplane, unless its weight on arrival, allowing for normal consumption of fuel and oil in flight, would allow a full stop landing at the intended destination within 60 percent of the effective length of each runway described below from a point 50 feet directly above the intersection of the obstruction clearance plane and the runway. For the purposes of determining the allowable landing weight at the destination airport the following is assumed:
(1) The airplane is landed on the most favorable runway and in the most favorable direction in still air.
(2) The airplane is landed on the most suitable runway considering the probable wind velocity and direction (forecast for the expected time of arrival), the ground handling characteristics of the type of airplane, and other conditions such as landing aids and terrain, and allowing for the effect of the landing path and roll of not more than 50 percent of the headwind component or not less than 150 percent of the tailwind component.
(b) An airplane that would be prohibited from being taken off because it could not meet the requirements of paragraph (a)(2) of this section may be taken off if an alternate airport is specified that meets all of the requirements of this section except that the airplane can accomplish a full stop landing within 70 percent of the effective length of the runway.
(c) This section does not apply to large nontransport category airplanes operated under § 121.173(c).

[Amdt. 121-251, 60 FR 65928, Dec. 20, 1995]

§ 121.187 Airplanes: Reciprocating engine powered: Landing limitations: Alternate airport.

(a) No person may list an airport as an alternate airport in a dispatch or flight release unless the airplane (at the weight anticipated at the time of arrival at the airport), based on the assumptions in § 121.185, can be brought to a full stop landing, within 70 percent of the effective length of the runway.
(b) This section does not apply to large nontransport category airplanes operated under § 121.173(c).

Part 135

§ 135.363 General.

(a) Each certificate holder operating a reciprocating engine powered large transport category airplane shall comply with §§ 135.365 through 135.377.
(b) Each certificate holder operating a turbine engine powered large transport category airplane shall comply with §§ 135.379 through 135.387, except that when it operates a turbopropeller powered large transport category airplane certificated after August 29, 1959, but previously type certificated with the same number of reciprocating engines, it may comply with §§ 135.365 through 135.377.
(c) Each certificate holder operating a large nontransport category airplane shall comply with §§ 135.389 through 135.395 and any determination of compliance must be based only on approved performance data. For the purpose of this subpart, a large nontransport category airplane is an airplane that was type certificated before July 1, 1942.
(d) Each certificate holder operating a small transport category airplane shall comply with § 135.397.
(e) Each certificate holder operating a small nontransport category airplane shall comply with § 135.399.
(f) The performance data in the Airplane Flight Manual applies in determining compliance with §§ 135.365 through 135.387. Where conditions are different from those on which the performance data is based, compliance is determined by interpolation or by computing the effects of change in the specific variables, if the results of the interpolation or computations are substantially as accurate as the results of direct tests.
(g) No person may takeoff a reciprocating engine powered large transport category airplane at a weight that is more than the allowable weight for the runway being used (determined under the runway takeoff limitations of the transport category operating rules of this subpart) after taking into account the temperature operating correction factors in section 4a.749a-T or section 4b.117 of the Civil Air Regulations in effect on January 31, 1965, and in the applicable Airplane Flight Manual.
(h) The Administrator may authorize in the operations specifications deviations from this subpart if special circumstances make a literal observance of a requirement unnecessary for safety.
(i) The 10 mile width specified in §§ 135.369 through 135.373 may be reduced to 5 miles, for not more than 20 miles, when operating under VFR or where navigation facilities furnish reliable and accurate identification of high ground and obstructions located outside of 5 miles, but within 10 miles, on each side of the intended track.
(j) Each certificate holder operating a commuter category airplane shall comply with § 135.398.

[Doc. No. 16097, 43 FR 46783, Oct. 10, 1978, as amended by Amdt. 135-21, 52 FR 1836, Jan. 15, 1987]

§ 135.365 Large transport category airplanes: Reciprocating engine powered: Weight limitations.

(a) No person may takeoff a reciprocating engine powered large transport category airplane from an airport located at an elevation outside of the range for which maximum takeoff weights have been determined for that airplane.
(b) No person may takeoff a reciprocating engine powered large transport category airplane for an airport of intended destination that is located at an elevation outside of the range for which maximum landing weights have been determined for that airplane.
(c) No person may specify, or have specified, an alternate airport that is located at an elevation outside of the range for which maximum landing weights have been determined for the reciprocating engine powered large transport category airplane concerned.
(d) No person may takeoff a reciprocating engine powered large transport category airplane at a weight more than the maximum authorized takeoff weight for the elevation of the airport.
(e) No person may takeoff a reciprocating engine powered large transport category airplane if its weight on arrival at the airport of destination will be more than the maximum authorized landing weight for the elevation of that airport, allowing for normal consumption of fuel and oil enroute.

§ 135.367 Large transport category airplanes: Reciprocating engine powered: Takeoff limitations.

(a) No person operating a reciprocating engine powered large transport category airplane may takeoff that airplane unless it is possible -
  (1) To stop the airplane safely on the runway, as shown by the accelerate-stop distance data, at any time during takeoff until reaching critical engine failure speed;
  (2) If the critical engine fails at any time after the airplane reaches critical engine failure speed V1, to continue the takeoff and reach a height of 50 feet, as indicated by the takeoff path data, before passing over the end of the runway; and
  (3) To clear all obstacles either by at least 50 feet vertically (as shown by the takeoff path data) or 200 feet horizontally within the airport boundaries and 300 feet horizontally beyond the boundaries, without banking before reaching a height of 50 feet (as shown by the takeoff path data) and after that without banking more than 15 degrees.
(b) In applying this section, corrections must be made for any runway gradient. To allow for wind effect, takeoff data based on still air may be corrected by taking into account not more than 50 percent of any reported headwind component and not less than 150 percent of any reported tailwind component.

§ 135.369 Large transport category airplanes: Reciprocating engine powered: Enroute limitations: All engines operating.

(a) No person operating a reciprocating engine powered large transport category airplane may takeoff that airplane at a weight, allowing for normal consumption of fuel and oil, that does not allow a rate of climb (in feet per minute), with all engines operating, of at least 6.90 VS0 (that is, the number of feet per minute obtained by multiplying the number of knots by 6.90) at an altitude of a least 1,000 feet above the highest ground or obstruction within ten miles of each side of the intended track.
(b) This section does not apply to large transport category airplanes certificated under Part 4a of the Civil Air Regulations.

§ 135.371 Large transport category airplanes: Reciprocating engine powered: Enroute limitations: One engine inoperative.

(a) Except as provided in paragraph (b) of this section, no person operating a reciprocating engine powered large transport category airplane may takeoff that airplane at a weight, allowing for normal consumption of fuel and oil, that does not allow a rate of climb (in feet per minute), with one engine inoperative, of at least (0.079 - 0.106 / N) VS02 (where N is the number of engines installed and VS0 is expressed in knots) at an altitude of least 1,000 feet above the highest ground or obstruction within 10 miles of each side of the intended track. However, for the purposes of this paragraph the rate of climb for transport category airplanes certificated under Part 4a of the Civil Air Regulations is 0.026 VS02.
(b) In place of the requirements of paragraph (a) of this section, a person may, under an approved procedure, operate a reciprocating engine powered large transport category airplane at an all engines operating altitude that allows the airplane to continue, after an engine failure, to an alternate airport where a landing can be made under § 135.377, allowing for normal consumption of fuel and oil. After the assumed failure, the flight path must clear the ground and any obstruction within five miles on each side of the intended track by at least 2,000 feet.
(c) If an approved procedure under paragraph (b) of this section is used, the certificate holder shall comply with the following:
    (1) The rate of climb (as prescribed in the Airplane Flight Manual for the appropriate weight and altitude) used in calculating the airplane's flight path shall be diminished by an amount in feet per minute, equal to (0.079 - 0.106 / N) VS02 (when N is the number of engines installed and VS0 is expressed in knots) for airplanes certificated under Part 25 of this chapter and by 0.026 VS02 for airplanes certificated under Part 4a of the Civil Air Regulations.
    (2) The all engines operating altitude shall be sufficient so that in the event the critical engine becomes inoperative at any point along the route, the flight will be able to proceed to a predetermined alternate airport by use of this procedure. In determining the takeoff weight, the airplane is assumed to pass over the critical obstruction following engine failure at a point no closer to the critical obstruction than the nearest approved radio navigational fix, unless the Administrator approves a procedure established on a different basis upon finding that adequate operational safeguards exist.

(3) The airplane must meet the provisions of paragraph (a) of this section at 1,000 feet above the airport used as an alternate in this procedure.
(4) The procedure must include an approved method of accounting for winds and temperatures that would otherwise adversely affect the flight path.
(5) In complying with this procedure, fuel jettisoning is allowed if the certificate holder shows that it has an adequate training program, that proper instructions are given to the flight crew, and all other precautions are taken to ensure a safe procedure.
(6) The certificate holder and the pilot in command shall jointly elect an alternate airport for which the appropriate weather reports or forecasts, or any combination of them, indicate that weather conditions will be at or above the alternate weather minimum specified in the certificate holder's operations specifications for that airport when the flight arrives.

§ 135.373 Part 25 transport category airplanes with four or more engines: Reciprocating engine powered: Enroute limitations: Two engines inoperative.

(a) No person may operate an airplane certificated under Part 25 and having four or more engines unless -
(1) There is no place along the intended track that is more than 90 minutes (with all engines operating at cruising power) from an airport that meets § 135.377; or
(2) It is operated at a weight allowing the airplane, with the two critical engines inoperative, to climb at 0.013 VS02 feet per minute (that is, the number of feet per minute obtained by multiplying the number of knots squared by 0.013) at an altitude of 1,000 feet above the highest ground or obstruction within 10 miles on each side of the intended track, or at an altitude of 5,000 feet, whichever is higher.
(b) For the purposes of paragraph (a)(2) of this section, it is assumed that -
(1) The two engines fail at the point that is most critical with respect to the takeoff weight;
(2) Consumption of fuel and oil is normal with all engines operating up to the point where the two engines fail with two engines operating beyond that point;
(3) Where the engines are assumed to fail at an altitude above the prescribed minimum altitude, compliance with the prescribed rate of climb at the prescribed minimum altitude need not be shown during the descent from the cruising altitude to the prescribed minimum altitude, if those requirements can be met once the prescribed minimum altitude is reached, and assuming descent to be along a net flight path and the rate of descent to be 0.013 VS02 greater than the rate in the approved performance data; and
(4) If fuel jettisoning is provided, the airplane's weight at the point where the two engines fail is considered to be not less than that which would include enough fuel to proceed to an airport meeting § 135.377 and to arrive at an altitude of at least 1,000 feet directly over that airport.

§ 135.375 Large transport category airplanes: Reciprocating engine powered: Landing limitations: Destination airports.

(a) Except as provided in paragraph (b) of this section, no person operating a reciprocating engine powered large transport category airplane may takeoff that airplane, unless its weight on arrival, allowing for normal consumption of fuel and oil in flight, would allow a full stop landing at the intended destination within 60 percent of the effective length of each runway described below from a point 50 feet directly above the intersection of the obstruction clearance plane and the runway. For the purposes of determining the allowable landing weight at the destination airport the following is assumed:
   (1) The airplane is landed on the most favorable runway and in the most favorable direction in still air.
   (2) The airplane is landed on the most suitable runway considering the probable wind velocity and direction (forecast for the expected time of arrival), the ground handling characteristics of the type of airplane, and other conditions such as landing aids and terrain, and allowing for the effect of the landing path and roll of not more than 50 percent of the headwind component or not less than 150 percent of the tailwind component.

(b) An airplane that would be prohibited from being taken off because it could not meet paragraph (a)(2) of this section may be taken off if an alternate airport is selected that meets all of this section except that the airplane can accomplish a full stop landing within 70 percent of the effective length of the runway.

§ 135.377 Large transport category airplanes: Reciprocating engine powered: Landing limitations: Alternate airports.

No person may list an airport as an alternate airport in a flight plan unless the airplane (at the weight anticipated at the time of arrival at the airport), based on the assumptions in § 135.375(a)(1) and (2), can be brought to a full stop landing within 70 percent of the effective length of the runway.

Current JAR text:

JAR-OPS 1.470 Applicability

(a) An operator shall ensure that multi-engine aeroplanes powered by turbopropeller engines with a maximum approved passenger seating configuration of more than 9 or a maximum take-off mass exceeding 5700 kg. and all multi-engine turbojet powered aeroplanes are operated in accordance with Subpart G (Performance Class A).

(b) An operator shall ensure that propeller driven aeroplanes with a maximum approved passenger seating configuration of 9 or less, and a maximum take-off mass of 5700 kg or less are operated in accordance with Subpart H (Performance Class B).

(c) An operator shall ensure that aeroplanes powered by reciprocating engines with a maximum approved passenger seating configuration of more than 9 or a maximum

take-off mass exceeding 5700 kg are operated in accordance with Subpart I (Performance Class C).

SUBPART H - PERFORMANCE CLASS B

JAR-OPS 1.525. General.

(a) An operator shall not operate a single-engine aeroplane:
  (1) At night; or
  (2) In Instrument Meteorological Conditions except under Special Visual Flight Rules.
  Note: Limitations on the operation of single-engine aeroplanes are covered by JAR-OPS 1.240(a)(6).

(b) An operator shall treat two-engine aeroplanes which do not meet the climb requirements of Appendix 1 to JAR-OPS 1.525(b) as single-engine aeroplanes.

JAR-OPS 1.530. Take-off.

(a) An operator shall ensure that the take-off mass does not exceed the maximum take-off mass specified in the Aeroplane Flight Manual for the pressure altitude and the ambient temperature at the aerodrome at which the take-off is to be made.

(b) An operator shall ensure that the unfactored take-off distance, as specified in the Aeroplane Flight Manual does not exceed:
  (1) When multiplied by a factor of 1.25, the take-off run available; or
  (2) When stopway and/or clearway is available, the following:
    (i) The take-off run available;
    (ii) When multiplied by a factor of 1.15, the take-off distance available; and
    (iii) When multiplied by a factor of 1.3, the accelerate-stop distance available.

(c) When showing compliance with sub-paragraph (b) above, an operator shall take account of the following:
  (1) The mass of the aeroplane at the commencement of the take-off run;
  (2) The pressure altitude at the aerodrome;
  (3) The ambient temperature at the aerodrome;
  (4) The runway surface condition and the type of runway surface (see AMC OPS 1.530(c)(4) & IEM OPS 1.530(c)(4));
  (5) The runway slope in the direction of take-off (see AMC OPS 1.530(c)(5)); and
  (6) Not more than 50% of the reported head-wind component or not less than 150% of the reported tail-wind component.

JAR-OPS 1.535.Take-off Obstacle Clearance - Multi-Engined Aeroplanes. (See IEM OPS 1.535)

(a) An operator shall ensure that the take-off flight path of aeroplanes with two or more engines, determined in accordance with this sub-paragraph, clears all obstacles by a vertical margin of at least 50 ft, or by a horizontal distance of at least 90 m plus 0.125

x D, where D is the horizontal distance travelled by the aeroplane from the end of the take-off distance available or the end of the take-off distance if a turn is scheduled before the end of the take-off distance available except as provided in sub-paragraphs (b) and (c) below. When showing compliance with this sub-paragraph (see AMC OPS 1.535(a) & IEM OPS 1.535(a)) it must be assumed that:

(1) The take-off flight path begins at a height of 50 ft above the surface at the end of the take-off distance required by JAR-OPS 1.530(b) and ends at a height of 1500 ft above the surface;

(2) The aeroplane is not banked before the aeroplane has reached a height of 50 ft above the surface, and that thereafter the angle of bank does not exceed 15°;

(3) Failure of the critical engine occurs at the point on the all engine take-off flight path where visual reference for the purpose of avoiding obstacles is expected to be lost;

(4) The gradient of the take-off flight path from 50 ft to the assumed engine failure height is equal to the average all-engine gradient during climb and transition to the en-route configuration, multiplied by a factor of 0.77; and

(5) The gradient of the take-off flight path from the height reached in accordance with sub-paragraph (4) above to the end of the take-off flight path is equal to the one engine inoperative en-route climb gradient shown in the Aeroplane Flight Manual.

(b) When showing compliance with sub-paragraph (a) above for those cases where the intended flight path does not require track changes of more than 15°, an operator need not consider those obstacles which have a lateral distance greater than:

(1) 300 m, if the flight is conducted under conditions allowing visual course guidance navigation, or if navigational aids are available enabling the pilot to maintain the intended flight path with the same accuracy (see Appendix 1 to JAR - OPS 1.535(b)(1) & (c)(1)); or

(2) 600 m, for flights under all other conditions.

(c) When showing compliance with sub-paragraph (a) above for those cases where the intended flight path requires track changes of more than 15°, an operator need not consider those obstacles which have a lateral distance greater than:

(1) 600 m for flights under conditions allowing visual course guidance navigation (see Appendix 1 to JAR-OPS 1.535(b)(1) & (c)(1));

(2) 900 m for flights under all other conditions.

(d) When showing compliance with sub-paragraphs (a), (b) and (c) above, an operator must take account of the following:

(1) The mass of the aeroplane at the commencement of the take-off run;

(2) The pressure altitude at the aerodrome;

(3) The ambient temperature at the aerodrome; and

(4) Not more than 50% of the reported head-wind component or not less than 150% of the reported tail-wind component.

JAR-OPS 1.540. En-Route - Multi-engined aeroplanes. (See IEM OPS 1.540)

(a) An operator shall ensure that the aeroplane, in the meteorological conditions expected for the flight, and in the event of the failure of one engine, with the

remaining engines operating within the maximum continuous power conditions specified, is capable of continuing flight at or above the relevant minimum altitudes for safe flight stated in the Operations Manual to a point 1000 ft above an aerodrome at which the performance requirements can be met.

(b) When showing compliance with sub-paragraph (a) above:
   (1) The aeroplane must not be assumed to be flying at an altitude exceeding that at which the rate of climb equals 300 ft per minute with all engines operating within the maximum continuous power conditions specified; and
   (2) The assumed en-route gradient with one engine inoperative shall be the gross gradient of descent or climb, as appropriate, respectively increased by a gradient of 0.5%, or decreased by a gradient of 0.5%.

JAR-OPS 1.542. En-Route - Single-engine aeroplanes. (See IEM OPS 1.542)

(a) An operator shall ensure that the aeroplane, in the meteorological conditions expected for the flight, and in the event of engine failure, is capable of reaching a place at which a safe forced landing can be made. For landplanes, a place on land is required, unless otherwise approved by the Authority.
(b) When showing compliance with sub-paragraph (a) above:
   (1) The aeroplane must not be assumed to be flying, with the engine operating within the maximum continuous power conditions specified, at an altitude exceeding that at which the rate of climb equals 300 ft per minute; and
   (2) The assumed en-route gradient shall be the gross gradient of descent increased by a gradient of 0.5%.

JAR-OPS 1.545. Landing - Destination and Alternate Aerodromes. (See AMC OPS 1.545 & 1.550)

An operator shall ensure that the landing mass of the aeroplane determined in accordance with JAR-OPS 1.475(a) does not exceed the maximum landing mass specified for the altitude and the ambient temperature expected for the estimated time of landing at the destination and alternate aerodrome.

JAR-OPS 1.550. Landing - Dry runway. (See AMC OPS 1.545 & 1.550)

(a) An operator shall ensure that the landing mass of the aeroplane determined in accordance with JAR-OPS 1.475(a) for the estimated time of landing allows a full stop landing from 50 ft above the threshold within 70% of the landing distance available at the destination aerodrome and at any alternate aerodrome. The Authority may approve the use of landing distance data factored in accordance with this paragraph and based on a screen height of less than 50 ft, but not less than 35 ft, for Steep Approach and Short Landing procedures. (See Appendix 1 to JAR-OPS 1.550(a).)
(b) When showing compliance with sub-paragraph (a) above, an operator shall take account of the following:

(1) The altitude at the aerodrome;
(2) Not more than 50% of the head-wind component or not less than 150% of the tail-wind component.
(3) The runway surface condition and the type of runway surface (see AMC OPS 1.550(b)(3)); and
(4) The runway slope in the direction of landing (see AMC OPS 1.550(b)(4));

(c) For despatching an aeroplane in accordance with sub-paragraph (a) above, it must be assumed that:
(1) The aeroplane will land on the most favourable runway, in still air; and
(2) The aeroplane will land on the runway most likely to be assigned considering the probable wind speed and direction and the ground handling characteristics of the aeroplane, and considering other conditions such as landing aids and terrain. (See IEM OPS 1.550(c).)

(d) If an operator is unable to comply with sub-paragraph (c)(2) above for the destination aerodrome, the aeroplane may be despatched if an alternate aerodrome is designated which permits full compliance with sub-paragraphs (a), (b) and (c) above.

JAR-OPS 1.555. Landing-Wet and Contaminated Runways

(a) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be wet, the landing distance available is equal to or exceeds the required landing distance, determined in accordance with JAR - OPS 1.550, multiplied by a factor of 1.15.

(b) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be contaminated, the landing distance, determined by using data acceptable to the Authority for these conditions, does not exceed the landing distance available.

(c) A landing distance on a wet runway shorter than that required by sub-paragraph (a) above, but not less than that required by JAR - OPS 1.550(a), may be used if the Aeroplane Flight Manual includes specific additional information about landing distances on wet runways.

SUBPART I - PERFORMANCE CLASS C

JAR-OPS 1.560. General.

An operator shall ensure that, for determining compliance with the requirements of this Subpart, the approved performance Data in the Aeroplane Flight Manual is supplemented, as necessary, with other Data acceptable to the Authority if the approved performance Data in the Aeroplane Flight Manual is insufficient.

JAR-OPS 1.565. Take-off.

(a) An operator shall ensure that the take-off mass does not exceed the maximum take-off mass specified in the Aeroplane Flight Manual for the pressure altitude and the ambient temperature at the aerodrome at which the take-off is to be made.
(b) An operator shall ensure that, for aeroplanes which have take-off field length data contained in their Aeroplane Flight Manuals that do not include engine failure accountability, the distance from the start of the take-off roll required by the aeroplane to reach a height of 50 ft above the surface with all engines operating within the maximum take-off power conditions specified, when multiplied by a factor of either:
(1) 1.33 for aeroplanes having two engines; or
(2) 1.25 for aeroplanes having three engines; or
(3) 1.18 for aeroplanes having four engines,
does not exceed the take-off run available at the aerodrome at which the take-off is to be made.
(c) An operator shall ensure that, for aeroplanes which have take-off field length data contained in their Aeroplane Flight Manuals which accounts for engine failure, the following requirements are met in accordance with the specifications in the Aeroplane Flight Manual:
(1) The accelerate-stop distance must not exceed the accelerate-stop distance available;
(2) The take-off distance must not exceed the take-off distance available, with a clearway distance not exceeding half of the take-off run available;
(3) The take-off run must not exceed the take-off run available;
(4) Compliance with this paragraph must be shown using a single value of V1 for the rejected and continued take-off; and
(5) On a wet or contaminated runway the take-off mass must not exceed that permitted for a take-off on a dry runway under the same conditions.
(d) When showing compliance with sub-paragraphs (b) and (c) above, an operator must take account of the following:
(1) The pressure altitude at the aerodrome;
(2) The ambient temperature at the aerodrome;
(3) The runway surface condition and the type of runway surface (see IEM OPS 1.565(d)(3));
(4) The runway slope in the direction of take-off (see AMC OPS 1.565(d)(4));
(5) Not more that 50% of the reported head-wind component or not less than 150% of the reported tail-wind component; and
(6) The loss, if any, of runway length due to alignment of the aeroplane prior to take-off.

JAR-OPS 1.570. Take-off Obstacle Clearance.

(a) An operator shall ensure that the take-off flight path with one engine inoperative clears all obstacles by a vertical distance of at least 50 ft plus 0.01 x D, or by a horizontal distance of at least 90 m plus 0.125 x D, where D is the horizontal distance the aeroplane has travelled from the end of the take-off distance available.

(b) The take-off flight path must begin at a height of 50 ft above the surface at the end of the take-off distance required by JAR-OPS 1.565(b) or (c) as applicable, and end at a height of 1500 ft above the surface.
(c) When showing compliance with sub-paragraph (a), an operator must take account of the following:
  (1) The mass of the aeroplane at the commencement of the take-off run;
  (2) The pressure altitude at the aerodrome;
  (3) The ambient temperature at the aerodrome; and
  (4) Not more than 50% of the reported head-wind component or not less than 150% of the reported tail-wind component.
(d) When showing compliance with sub-paragraph (a) above, track changes shall not be allowed up to that point of the take-off flight path where a height of 50 ft above the surface has been achieved. Thereafter, up to a height of 400 ft it is assumed that the aeroplane is banked by no more than 15°. Above 400 ft height bank angles greater than 15°, but not more than 25° may be scheduled. Adequate allowance must be made for the effect of bank angle on operating speeds and flight path including the distance increments resulting from increased operating speeds. (See AMC OPS 1.570(d).)
(e) When showing compliance with sub-paragraph (a) above for those cases which do not require track changes of more than 15°, an operator need not consider those obstacles which have a lateral distance greater than:
  (1) 300 m, if the pilot is able to maintain the required navigational accuracy through the obstacle accountability area; or
  (2) 600 m, for flights under all other conditions.
(f) When showing compliance with sub-paragraph (a) above for those cases which do require track changes of more than 15°, an operator need not consider those obstacles which have a lateral distance greater than:
  (1) 600 m, if the pilot is able to maintain the required navigational accuracy through the obstacle accountability area; or
  (2) 900 m for flights under all other conditions.
(g) An operator shall establish contingency procedures to satisfy the requirements of JAR - OPS 1.570 and to provide a safe route, avoiding obstacles, to enable the aeroplane to either comply with the en-route requirements of JAR - OPS 1.570, or land at either the aerodrome of departure or at a take-off alternate aerodrome.

JAR-OPS 1.575. En-Route-All Engines Operating.

(a) An operator shall ensure that the aeroplane will, in the meteorological conditions expected for the flight, at any point on its route or on any planned diversion therefrom, be capable of a rate of climb of at least 300 ft per minute with all engines operating within the maximum continuous power conditions specified at:
  (1) The minimum altitudes for safe flight on each stage of the route to be flown or of any planned diversion therefrom specified in, or calculated from the information contained in, the Operations Manual relating to the aeroplane; and
  (2) The minimum altitudes necessary for compliance with the conditions prescribed in JAR - OPS 1.580 and 1.585, as appropriate.

JAR-OPS 1.580. En-Route-One Engine Inoperative. (See AMC OPS 1.580)

(a) An operator shall ensure that the aeroplane will, in the meteorological conditions expected for the flight, in the event of any one engine becoming inoperative at any point on its route or on any planned diversion therefrom and with the other engine or engines operating within the maximum continuous power conditions specified, be capable of continuing the flight from the cruising altitude to an aerodrome where a landing can be made in accordance with JAR-OPS 1.595 or JAR-OPS 1.600 as appropriate, clearing obstacles within 9.3 km (5 nm) either side of the intended track by a vertical interval of at least:
   (1) 1000 ft when the rate of climb is zero or greater; or
   (2) 2000 ft when the rate of climb is less than zero.

(b) The flight path shall have a positive slope at an altitude of 450 m (1500 ft) above the aerodrome where the landing is assumed to be made after the failure of one engine.

(c) For the purpose of this sub-paragraph the available rate of climb of the aeroplane shall be taken to be 150 ft per minute less than the gross rate of climb specified.

(d) When showing compliance with this paragraph, an operator must increase the width margins of sub-paragraph (a) above to 18.5 km (10 nm) if the navigational accuracy does not meet the 95% containment level.

(e) Fuel jettisoning is permitted to an extent consistent with reaching the aerodrome with the required fuel reserves, if a safe procedure is used.

JAR-OPS 1.585. En-Route-Aeroplanes With Three Or More Engines, Two Engines Inoperative.

(a) An operator shall ensure that, at no point along the intended track, will an aeroplane having three or more engines be more than 90 minutes at the all-engine long range cruising speed at standard temperature in still air, away from an aerodrome at which the performance requirements applicable at the expected landing mass are met unless it complies with sub-paragraphs (b) to (e) below.

(b) The two-engines inoperative flight path shown must permit the aeroplane to continue the flight, in the expected meteorological conditions, clearing all obstacles within 9.3 km (5 nm) either side of the intended track by a vertical interval of at least 2000 ft, to an aerodrome at which the performance requirements applicable at the expected landing mass are met.

(c) The two engines are assumed to fail at the most critical point of that portion of the route where the aeroplane is more than 90 minutes, at the all engines long range cruising speed at standard temperature in still air, away from an aerodrome at which the performance requirements applicable at the expected landing mass are met.

(d) The expected mass of the aeroplane at the point where the two engines are assumed to fail must not be less than that which would include sufficient fuel to proceed to an aerodrome where the landing is assumed to be made, and to arrive there at an altitude of a least 450 m (1500 ft) directly over the landing area and thereafter to fly level for 15 minutes.

(e) For the purpose of this sub-paragraph the available rate of climb of the aeroplane shall be taken to be 150 ft per minute less than that specified.
(f) When showing compliance with this paragraph, an operator must increase the width margins of sub-paragraph (a) above to 18.5 km (10 nm) if the navigational accuracy does not meet the 95% containment level.
(g) Fuel jettisoning is permitted to an extent consistent with reaching the aerodrome with the required fuel reserves, if a safe procedure is used.

JAR-OPS 1.590. Landing-Destination and Alternate Aerodromes. (See AMC OPS 1.590 and 1.595)

An operator shall ensure that the landing mass of the aeroplane determined in accordance with JAR-OPS 1.475(a) does not exceed the maximum landing mass specified in the Aeroplane Flight Manual for the altitude and, if accounted for in the Aeroplane Flight Manual, the ambient temperature expected for the estimated time of landing at the destination and alternate aerodrome.

JAR-OPS 1.595. Landing-Dry Runways. (See AMC OPS 1.590 and 1.595)

(a) An operator shall ensure that the landing mass of the aeroplane determined in accordance with JAR-OPS 1.475(a) for the estimated time of landing allows a full stop landing from 50 ft above the threshold within 70% of the landing distance available at the destination and any alternate aerodrome.
(b) When showing compliance with sub-paragraph (a) above, an operator must take account of the following:
    (1) The altitude at the aerodrome;
    (2) Not more than 50% of the head-wind component or not less than 150% of the tail-wind component;
    (3) The type of runway surface (see AMC OPS 1.595(b)(3)); and
    (4) The slope of the runway in the direction of landing (see AMC OPS 1.595(b)(4)).
(c) For despatching an aeroplane in accordance with sub-paragraph (a) above it must be assumed that:
    (1) The aeroplane will land on the most favourable runway in still air; and
    (2) The aeroplane will land on the runway most likely to be assigned considering the probable wind speed and direction and the ground handling characteristics of the aeroplane, and considering other conditions such as landing aids and terrain. (See IEM OPS 1.595(c).)
(d) If an operator is unable to comply with sub-paragraph (b)(2) above for the destination aerodrome, the aeroplane may be despatched if an alternate aerodrome is designated which permits full compliance with sub-paragraphs (a), (b) and (c).

JAR-OPS 1.600. Landing-Wet and Contaminated Runways.

(a) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be

wet, the landing distance available is equal to or exceeds the required landing distance, determined in accordance with JAR - OPS 1.595, multiplied by a factor of 1.15.

(b) An operator shall ensure that when the appropriate weather reports or forecasts, or a combination thereof, indicate that the runway at the estimated time of arrival may be contaminated, the landing distance determined by using data acceptable to the Authority for these conditions, does not exceed the landing distance available.

2a – If no FAR or JAR standard exists, what means have been used to ensure this safety issue is addressed? [Reproduce text from issue papers, special conditions, policy, certification action items, etc., that have been used relative to this issue]

N/A

3 - What are the differences in the FAA and JAA standards or policy and what do these differences result in? [Explain the differences in the standards or policy, and what these differences result in relative to (as applicable) design features/capability, safety margins, cost, stringency, etc.]

Currently, the Part 121/135 Subpart I airplane performance operating rules differentiate between two types of aircraft: reciprocating engine powered and turbine engine powered. The JAR recognizes three different airplane performance categories:

Class A: All Multi-engine turbojets aircraft, and any multi-engine turbopropeller aircraft with a maximum approved passenger seating configuration of more than 9, or a maximum takeoff weight exceeding 5700 kg (12,566 lb).

Class B: Any propeller driven aircraft with a maximum approved passenger seating configuration of 9 or less, and a maximum takeoff weight of 5700 kg (12,566 lb).

Class C: Any aircraft powered by reciprocating engines with a maximum approved passenger seating configuration of more than 9 or a maximum takeoff weight exceeding 5700 kg (12,566 lb).

The FAR divides performance requirements based on the engine type, whereas the JAR considers engine type, seating configuration and maximum allowable takeoff weight. The FAR is the more stringent because both the Part 121 and 135 performance rules apply to all aircraft, regardless of size or seating configuration. The focus of the harmonization effort was on matching the 121/135 rules with the JAR Class A aircraft requirements. It was the decision of the Performance Harmonization Working Group to not create a separate Class B and Class C category within the FAR. The Class B and Class C aircraft are commuter aircraft, and therefore there is no real competitive

economic advantage for a JAR operator verses an FAA operator since the two operators would never be operating the same aircraft into the same airport.

4 - What, if any, are the differences in the current means of compliance? [Provide a brief explanation of any differences in the current compliance criteria or methodology (e.g., issue papers), including any differences in either criteria, methodology, or application that result in a difference in stringency between the standards.]

N/A – For certain types of commuter aircraft, there is a difference in the performance requirements between the FAR and JAR, however, the decision by the Performance Harmonization Working Group was to not harmonize on these differences since there is no competing operations of these aircraft types.

5 – What is the proposed action? [Describe the new proposed requirement, or the proposed change to the existing requirement, as applicable. Is the proposed action to introduce a new standard, or to take some other action? Explain what action is being proposed (not the regulatory text, but the underlying rationale) and why that direction was chosen for each proposed action.]

The proposed action is to not harmonize to the JAR standard. The harmonization of the FAR and JAR performance operating rules is based on providing a level economic playing field. Since JAR Class B and Class C aircraft do not compete against US operators, there is no competitive benefit to be lost or gained by adopting this change into the FAR.